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EXAMINER	
THANGAVELU, KANDASAMY	
ART UNIT	**PAPER NUMBER**
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/812,403	RANKIN ET AL.	
	Examiner	Art Unit	
	Kandasamy Thangavelu	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-22 of the application have been examined.

Information Disclosure Statement

2. Acknowledgment is made of the information disclosure statements filed on March 16, 2001, June 14, 2001, August 13, 2001 and August 16, 2002. However, the examiner does not have access to the papers and foreign patents referenced in those information disclosure statements. The applicants are requested to send copies of the papers and foreign patents referenced in those information disclosure statements in reply to this office action.

Drawings

3. The drawings submitted on 21 March 2001 are accepted.

Specification

4. The disclosure is objected to because of the following informalities:

In Page 8, Lines 7-8, “sensors could also be utilized and controller” appears to be incorrect and it appears that it should be “sensors could also be utilized and controlled”.

In Page 10, Lines 11-13, “a plurality of flat patches are grown out of the tessellated surface, as generally indicated by reference number 20” appears to be incorrect and it appears that it should be “a plurality of flat patches are grown out of the tessellated surface, as generally indicated by reference number 26”.

In Page 13, Lines 18-19, “as generally indicated by reference n umber 56” appears to be incorrect and it appears that it should be, “as generally indicated by reference number 56”.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 14 recite the limitation "The method as recited in claim 12" in Line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 12 refers to “An automated CAD-guided sensor planning system” and not an apparatus.

Claim 15 recites the limitation " The method as recited in claim 14" in Line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 14 refers to "The method as recited in claim 12", but Claim 12 refers to "An automated CAD-guided sensor planning system" and not an apparatus.

Claim Interpretations

7. In Claims 13 and 14, the limitation "The method as recited in claim 12" has been interpreted as "The system as recited in claim 12".

In Claim 15, the limitation "The method as recited in claim 14" has been interpreted as "The system as recited in claim 14".

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

9. Claims 1, 5, 12, 14 and 16 are rejected under 35 U.S.C. § 102(e) as being anticipated by **Wooster et al.** (U.S. Patent 6,023,680).

9.1 **Wooster et al.** teaches methods, apparatus and computer program products for automated visual inspection. Specifically, as per claim 1, **Wooster et al.** teaches a method automatically determining one or more sensor locations for sensing a surface of a physical part (CL1, L47-62); comprising:

inputting a CAD model, which is representative of the surface of the physical part, into a sensor planner (CL2, L27-30);

inputting a sensor model, which is representative of a 3D image capturing sensor, into the sensor planner (CL1, L28-35; CL3, L36-39; CL4, L15-22);

subdividing the CAD model of the surface of the physical part into a plurality of discrete partitions (CL2, L27-40);

grouping the plurality of discrete partitions into one or more subgroups based on visibility criterion (CL2, L43-44; CL3, L39-42; CL3, L54-58; CL4, L29-32; CL7, L7-11; CL7, L60-63; CL8, L65 to CL9, L1); and

outputting automatically a set of viewing positions and orientations for the sensor (CL3, L6-8; CL3, L59-67; CL4, L22-28).

Per Claim 5: **Wooster et al.** teaches forming a plurality of flat patches that together capture the entire surface of the physical part (CL2, L37-40; CL2, L46-49).

9.2 As per claim 12, **Wooster et al.** teaches an automated CAD-guided sensor planning system (Fig. 1; CL1, L47-62; CL3, L1-5); comprising:

a CAD model, which is a computer representation of one or more surfaces of a physical object that are to be measured (CL2, L27-30);

a sensor model, which is a mathematical representation of a 3-D image capturing sensor (CL1, L28-35; CL3, L36-39; CL4, L15-22); and

a sensor planner that receives the CAD model and the sensor model and utilizes them to automatically determine a set of sensor viewing positions and orientations (CL1, L47-62; CL2, L24-26; CL3, L6-8; CL3, L59-67; CL4, L22-28).

Per Claim 14: **Wooster et al.** teaches a controller for receiving the set of sensor viewing positions and orientations and using them to control a physical device to locate the sensor accordingly (CL3, L6-8; CL3, L59-67; CL4, L22-28).

Per Claim 16: **Wooster et al.** teaches the physical device is a robot (CL8, L29-40).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 2-4, 6-11, 13, 15 and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wooster et al.** (U.S. Patent 6,023,680) in view of **Xi et al.** (U.S. Patent 6,597,967).

12.1 As per claim 2, **Wooster et al.** teaches the method of claim 1. **Wooster et al.** does not expressly teach that the plurality of discrete partitions are formed in the shape of triangles. **Xi et al.** teaches that the plurality of discrete partitions are formed in the shape of triangles (CL3, L33-38), as the deviations of the triangular facets from the actual surface of the workpiece can be controlled to meet the requirements of the specific manufacturing applications (CL3, L39-42). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included the plurality of discrete partitions being formed in the shape of triangles. The artisan would have been motivated because that would allow the deviations of the triangular facets from the actual surface of the workpiece being controlled to meet the requirements of the specific manufacturing applications.

12.2 As per claim 3, **Wooster et al.** teaches the method of claim 1. **Wooster et al.** does not expressly teach that the grouping further comprises selecting a seed partition from the plurality of partitions. **Xi et al.** teaches that the grouping further comprises selecting a seed partition from the plurality of partitions (CL3, L53-64), as due to the complexity of a part surface in a typical manufacturing application, it is difficult to plan a tool path using a plurality of facets (CL3, L51-53); and the general approach is to group neighboring facets in order to form relatively flat patches of facets (Cl3, L58-59). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included the grouping further comprises selecting a seed partition from the plurality of partitions. The artisan would have been motivated because due to the complexity of a part surface in a typical manufacturing application, it would be difficult to plan a tool path using a plurality of facets; and the general approach would be to group neighboring facets in order to form relatively flat patches of facets.

12.3 As per claim 4, **Wooster et al.** and **Xi et al.** teach the method of claim 3. **Wooster et al.** does not expressly teach that the grouping further comprises forming at least one flat patch, which includes all partitions adjacent the seed partition having a normal vector that forms an angle with an average normal of the grouping that is less than a predetermined value. **Xi et al.** teaches that the grouping further comprises forming at least one flat patch, which includes all partitions adjacent the seed partition having a normal vector that forms an angle with an average normal of the grouping that is less than a predetermined value (CL3, L53-59; CL3, L65 to CL4,

L14), as due to the complexity of a part surface in a typical manufacturing application, it is difficult to plan a tool path using a plurality of facets (CL3, L51-53); and the general approach is to group neighboring facets in order to form relatively flat patches of facets (Cl3, L58-59). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included the grouping further comprising forming at least one flat patch, which included all partitions adjacent the seed partition having a normal vector that formed an angle with an average normal of the grouping that was less than a predetermined value. The artisan would have been motivated because due to the complexity of a part surface in a typical manufacturing application, it would be difficult to plan a tool path using a plurality of facets; and the general approach would be to group neighboring facets in order to form relatively flat patches of facets.

12.4 As per claim 6, **Wooster et al.** and **Xi et al.** teach the method of claim 4. **Wooster et al.** does not expressly teach constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face is maximized. **Xi et al.** teaches constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face is maximized (CL4, L47-54), as that allows all of the vertices to be projected on the front direction to determine two end vertices so a view line for sensor location can be defined between the two points (CL4, L54-56; CL4, L63 to CL5, L2). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et**

al. that included constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face was maximized. The artisan would have been motivated because that would allow all of the vertices to be projected on the front direction to determine two end vertices so a view line for sensor location can be defined between the two points.

12.5 As per claim 7, **Wooster et al.** and **Xi et al.** teach the method of claim 6. **Wooster et al.** does not expressly teach determining the sensor position closest to the surface that encompasses all of the at least one flat patch. **Xi et al.** teaches determining the sensor position closest to the surface that encompasses all of the at least one flat patch (CL4, L54-59; CL5, L2-4), as that allows using that sensor position as one end of the view line which is used to search for the location of the viewpoint that meets the resolution and other operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining the sensor position closest to the surface that encompasses all of the at least one flat patch. The artisan would have been motivated because that would allow using that sensor position as one end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

12.6 As per claim 8, **Wooster et al.** and **Xi et al.** teach the method of claim 7. **Wooster et al.** does not expressly teach determining the sensor position farthest from the surface of the part that meets predetermined resolution requirements. **Xi et al.** teaches determining the sensor position

farthest from the surface of the part that meets predetermined resolution requirements (CL5, L4-7), as that allows using that sensor position as a second end of the view line which is used to search for the location of the viewpoint that meets the resolution and other operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining the sensor position farthest from the surface of the part that meets predetermined resolution requirements. The artisan would have been motivated because that would allow using that sensor position as a second end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

12.7 As per claim 9, **Wooster et al.** and **Xi et al.** teach the method of claim 8. **Wooster et al.** does not expressly teach locating a sensor position that meets the predetermined resolution requirements. **Xi et al.** teaches locating a sensor position that meets the predetermined resolution requirements (CL5, L8-21), as a point is determined to be a viewpoint for locating a sensor, if the resolution and/or other operational parameter constraints are met by the point (CL5, L14-17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included locating a sensor position that met the predetermined resolution requirements. The artisan would have been motivated because a point would be determined to be a viewpoint for locating a sensor, if the resolution and/or other operational parameter constraints were met by the point.

12.8 As per claim 10, **Wooster et al.** and **Xi et al.** teach the method of claim 9. **Wooster et al.** teaches outputting the located sensor position to a controller in order to automatically position the sensor (CL3, L6-8; CL3, L59-67; CL4, L22-28).

12.9 As per claim 11, **Wooster et al.** and **Xi et al.** teach the method of claim 10. **Wooster et al.** does not expressly teach splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements. **Xi et al.** teaches splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements (CL5, L22-27), as none of the point positions on the view line would satisfy the resolution and/or other operational constraints indicating the selected groups of facets is too large to be inspected at only one viewpoint by the sensor (CL5, L22-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements. The artisan would have been motivated because as none of the point positions on the view line would satisfy the resolution and/or other operational constraints indicating the selected groups of facets was too large to be inspected at only one viewpoint by the sensor.

12.10 As per claim 13, **Wooster et al.** teaches the system of claim 12. **Wooster et al.** does not expressly teach that the sensor model includes descriptions of one or more variables about the

sensor: visibility, resolution, field of view, focal length and depth of field. **Xi et al.** teaches that the sensor model includes descriptions of one or more variables about the sensor: visibility, resolution, field of view, focal length and depth of field (CL5, L41-44), as the viewpoint of the sensor is based on these constraints related to the sensor (CL5, L41-42). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Wooster et al.** with the system of **Xi et al.** that included the sensor model including descriptions of one or more variables about the sensor: visibility, resolution, field of view, focal length and depth of field. The artisan would have been motivated because the viewpoint of the sensor would be based on these constraints related to the sensor.

12.11 As per claim 17, **Wooster et al.** teaches an automated CAD-guided sensor planning method (CL1, L47-62); comprising:

providing a CAD model of a physical part to be examined (CL2, L27-30);

providing a sensor model representative of a 3-D image capturing device (CL1, L28-35; CL3, L36-39; CL4, L15-22); and

tessellating at least one surface of the CAD model of the physical part by subdividing it into a plurality of partitions (CL2, L27-40).

Wooster et al. does not expressly teach determining at least one flat patch on the at least one surface, the flat patch being comprised of one or more of the plurality of partitions. **Xi et al.** teaches determining at least one flat patch on the at least one surface, the flat patch being comprised of one or more of the plurality of partitions (CL3, L53-59; CL3, L65 to CL4, L14), as

due to the complexity of a part surface in a typical manufacturing application, it is difficult to plan a tool path using a plurality of facets (CL3, L51-53); and the general approach is to group neighboring facets in order to form relatively flat patches of facets (Cl3, L58-59). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining at least one flat patch on the at least one surface, the flat patch being comprised of one or more of the plurality of partitions. The artisan would have been motivated because due to the complexity of a part surface in a typical manufacturing application, it would be difficult to plan a tool path using a plurality of facets; and the general approach would be to group neighboring facets in order to form relatively flat patches of facets.

Wooster et al. does not expressly teach determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch. **Xi et al.** teaches determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch (CL4, L54-59; CL5, L2-4), as that allows using that sensor position as one end of the view line which is used to search for the location of the viewpoint that meets the resolution and other operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch. The artisan would have been motivated because that would allow using that sensor position as one end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

Wooster et al. does not expressly teach determine a furthest position of the sensor to the at least one surface having sufficient resolution. **Xi et al.** teaches determine a furthest position of the sensor to the at least one surface having sufficient resolution (CL5, L4-7), as that allows using that sensor position as a second end of the view line which is used to search for the location of the viewpoint that meets the resolution and other operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determine a furthest position of the sensor to the at least one surface having sufficient resolution. The artisan would have been motivated because that would allow using that sensor position as a second end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

Wooster et al. does not expressly teach outputting a sensor location based on the closest position that encompasses the entire flat patch and the farthest position with sufficient resolution. **Xi et al.** teaches outputting a sensor location based on the closest position that encompasses the entire flat patch and the farthest position with sufficient resolution (CL4, L54-59; CL5, L2-4; CL5, L4-7), as a point is determined to be a viewpoint for locating a sensor, if the resolution and/or other operational parameter constraints are met by the point (CL5, L14-17); and as per **Wooster et al.** the inspection time will be minimized by minimizing the number of views required for viewing the inspection region (CL3, L21-22). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included outputting a sensor location based on the closest position that encompasses the entire flat patch and the farthest position with sufficient resolution.

The artisan would have been motivated because a point would be determined to be a viewpoint for locating a sensor, if the resolution and/or other operational parameter constraints were met by the point; and the inspection time would be minimized by minimizing the number of views required for viewing the inspection region.

12.12 As per claim 18, **Wooster et al.** and **Xi et al.** teach the method of claim 17. **Wooster et al.** does not expressly teach that the at least one surface is subdivided into a plurality of triangles. **Xi et al.** teaches that the at least one surface is subdivided into a plurality of triangles (CL3, L33-38), as the deviations of the triangular facets from the actual surface of the workpiece can be controlled to meet the requirements of the specific manufacturing applications (CL3, L39-42). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included the at least one surface being subdivided into a plurality of triangles. The artisan would have been motivated because that would allow the deviations of the triangular facets from the actual surface of the workpiece being controlled to meet the requirements of the specific manufacturing applications.

12.13 As per claim 19, **Wooster et al.** and **Xi et al.** teach the method of claim 17. **Wooster et al.** does not expressly teach determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch. **Xi et al.** teaches determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch (CL4, L54-59; CL5, L2-4), as that allows using that sensor position as one end of the view line which is used to search for the location of the viewpoint that meets the resolution and other

operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining a closest position for the sensor to the at least one surface that encompasses all of the at least one flat patch. The artisan would have been motivated because that would allow using that sensor position as one end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

12.14 As per claim 20, **Wooster et al.** and **Xi et al.** teach the method of claim 19. **Wooster et al.** does not expressly teach determining a furthest position of the sensor to the at least one surface having sufficient resolution. **Xi et al.** teaches determining a furthest position of the sensor to the at least one surface having sufficient resolution (CL5, L4-7), as that allows using that sensor position as a second end of the view line which is used to search for the location of the viewpoint that meets the resolution and other operational constraints (CL4, L63 to CL5, L17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included determining a furthest position of the sensor to the at least one surface having sufficient resolution. The artisan would have been motivated because that would allow using that sensor position as a second end of the view line which would be used to search for the location of the viewpoint that met the resolution and other operational constraints.

12.15 As per claim 21, **Wooster et al.** and **Xi et al.** teach the method of claim 20. **Wooster et al.** does not expressly teach constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face is maximized. **Xi et al.** teaches constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face is maximized (CL4, L47-54), as that allows all of the vertices to be projected on the front direction to determine two end vertices so a view line for sensor location can be defined between the two points (CL4, L54-56; CL4, L63 to CL5, L2). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included constructing a bounding box around the at least one flat patch, the bounding box having a front face representing a direction where the projected area of the at least one flat patch onto the front face was maximized. The artisan would have been motivated because that would allow all of the vertices to be projected on the front direction to determine two end vertices so a view line for sensor location can be defined between the two points.

12.16 As per claim 22, **Wooster et al.** and **Xi et al.** teach the method of claim 21. **Wooster et al.** does not expressly teach splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements. **Xi et al.** teaches splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements (CL5, L22-27), as none of the point positions on the view line would satisfy the

resolution and/or other operational constraints indicating the selected groups of facets is too large to be inspected at only one viewpoint by the sensor (CL5, L22-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Wooster et al.** with the method of **Xi et al.** that included splitting the at least one flat patch if the front face is too large for the sensor to capture the at least one flat patch and satisfy the predetermined resolution requirements. The artisan would have been motivated because as none of the point positions on the view line would satisfy the resolution and/or other operational constraints indicating the selected groups of facets was too large to be inspected at only one viewpoint by the sensor.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wooster et al.** (U.S. Patent 6,023,680) in view of **Merat et al.** (U.S. Patent 5,465,221).

13.1 As per claim 15, **Wooster et al.** teaches the system of claim 14. **Wooster et al.** does not expressly teach that the physical device is a coordinate measurement machine. **Merat et al.** teaches that the physical device is a coordinate measurement machine (Abstract, L1-2; CL1, L24-29), as coordinate measurement machines are used extensively in industry for automated industrial inspection of machine parts (CL1, L27-29). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Wooster et al.** with the system of **Merat et al.** that included the physical device being a coordinate measurement machine. The artisan would have been motivated as coordinate measurement machines were used extensively in industry for automated industrial inspection of machine parts.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 703-305-0043. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on (703) 305-9704. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.

K. Thangavelu
Art Unit 2123
June 24, 2004

KEVIN J. TESKA
SUPERVISORY
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